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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/329,889 06/10/99 BOUSSAC S 005974/00011

027383 TM02/1022
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EXAMINER

THANGAVELIL K

ART UNIT

PAPER NUMBER

2123

DATE MAILED:

10/22/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/329,889

Applicant(s)

BOUSSAC ET AL.

Examiner

Kandasamy Thangavelu

Art Unit

2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 June 1999 and 06 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 June 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 . 6) ☐ Other: _____

DETAILED ACTION

Introduction

1. Claims 1 to 20 of the Application 09/329889 filed on 10 June 1999 are pending.

Drawings

2. This application has been filed with informal drawings that are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

Figures 11-14 are objected to due to shading problems. The applicant is advised to provide these drawings with alternate hatching schemes. Figure 10 is objected to because it does not have legend. See MPEP § 608.02.

Abstract

3. The abstract of the disclosure is objected to because of the period (.) in line 8 after the word polygon. The following text is not a proper sentence and does not make sense. Appropriate correction is required. See MPEP § 608.01(b).

Claim Objections

4. The following is a quotation of 37 C.F.R § 1.75 (d)(1):

The claim or claims must conform to the invention as set forth in the remainder of the specification and terms and phrases in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

5. Claims 10 and 11 are objected to because of the following informalities.

In Claim 10, the wording "wherein an entity comprising ... path of the object are filtered" is grammatically incorrect.

In Claim 11, the wording "a graphical user interface ... by causing the a program stored in the memory" is grammatically incorrect.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1- 20 are rejected under 35 U.S.C. 101 because the claimed inventions are directed to non-statutory subject matter.

Claim 1 recites a mathematical algorithm which consists of generating a polyhedral representation of a computer modeled object, representing the motion of the object with a set of position matrices, determining a subset of free neighborhood entities comprising the object for each matrix, generating traces by the motion of the free neighborhood entities and constructing a representation of the swept volume from the traces. A mathematical algorithm is not statutory subject matter.

Claims 2, 3 and 4 depend on Claim 1 but do not add further statutory steps.

Claims 5 and 6 depend on Claim 4 but do not add further statutory steps.

Claims 7-10 depend on Claim 1 but do not add further statutory steps.

Claim 11 involves a mathematical algorithm which consists of generating a polyhedral representation of a computer modeled object, representing the motion of the object with a set of position matrices, determining a subset of free neighborhood entities comprising the object for

each matrix, generating traces by the motion of the free neighborhood entities and constructing a representation of the swept volume from the traces. A mathematical algorithm is not statutory subject matter.

Claims 12-15 depend on Claim 11 but do not add further statutory steps.

Claim 16 involves a mathematical algorithm which consists of selecting an object, extracting an array of free neighborhood of triangles and edges from the object based on a trajectory, selecting a position matrix, transforming an array of triangles and edges according to the position matrix, computing a trace for an edge comprising the array and moving through the tangent zone and adding the edge to a table or adding a triangle moving through a material zone to the table and modeling a polyhedron from the data stored in the table. A mathematical algorithm is not statutory subject matter.

Claim 17 involves a mathematical algorithm which consists of generating a polyhedral representation of a computer modeled object, representing the motion of the object with a set of position matrices, determining a subset of free neighborhood entities comprising the object for each matrix, generating traces by the motion of the free neighborhood entities and constructing a representation of the swept volume from the traces. A mathematical algorithm is not statutory subject matter.

Claim 18 depends on Claim 17 but does not add further statutory steps.

Claim 19 involves a mathematical algorithm which consists of launching a program that includes a command to generate a swept volume model, selecting an object to model, selecting the motion to be applied to the object and issuing a command to generate a polyhedron representing a swept volume. A mathematical algorithm is not statutory subject matter.

Claim 20 depends on Claim 19 but does not add further statutory steps.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

8. Claim 1 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **Xavier (XA)**.

Claim 1 specifies:

1. Generating a polyhedral representation of a computer modeled object
 2. Representing the motion of the object with a set of position matrices
 3. Determining a subset of free neighborhood entities comprising the object for each matrix
 4. Generating traces by the motion of the free neighborhood entities
 5. Constructing a representation of the swept volume from the traces.
9. **Xavier (XA)** (U.S. Patent 6,099,573) teaches that:
1. Modeling interactions among complex polyhedra in motion (Col 1, Para 2).
 2. Hierarchical structures use various primitives to bound an object or its surface (Col 2, Para 2).
 3. Bodies undergoing translations and rotations are represented by swept volume representations (Col 3, Para 3).
 4. A body can be represented by a union of complex polygons and polyhedra (Col 3, Para 4).
 5. A body undergoing translation can be represented by swept body representations (Col 3, Para 4).
 6. Swept body representation comprises a hierarchical bounding volume representation. It is a region swept by the surface of the body during translation (Col 3, Para 4).

7. Interactions between bodies can be modeled by modeling the interactions between convex hulls of finite sets of discrete points in the swept body representation (Col 3, Para 4).
 8. The moving bodies each experience independent linear translation and can also experience a rotation (Col 3, Para 12).
 9. The representations can be from measured parameters from physical devices or models or computer predicted data (Col 4, Para 2).
 10. Input representations are transformed into hierarchical bounding volume representations. The hierarchy produced by the method is a binary tree whose nodes each contain a convex polygon or convex polyhedron (Col 4, Para 3).
 11. A variation is to limit the number of vertices on each polyhedron or polygon at interior nodes of the bounding volume hierarchy (Col 4, Para 3).
 12. Data structures allow each body to be mapped to a different position and location in space, simply by applying the respective mapping to the vertices (Col 4, Para 4).
 13. Each node of the swept volume bounding volume hierarchy need only be computed as it is needed (Col 4, Para 5).
 14. At each node, an actual bounding volume is not computed but rather a set of vertices whose convex hull is the bounding volume is computed (Col 4, Para 5).
 15. At each node of the bounding volume representation, they apply the motion transformation to the vertices of the polygon or polyhedron at the node and add the resulting vertices to those at the node (Col 4, Para 5).
 16. The convex hull of the combined set of vertices is the region swept out by the node (Col 4, Para 5).
 17. The apparatus consists of a Processor connected with input subsystem, output subsystem and storage subsystem (Col 12, Para 7).
 18. The means can be programmed in software (Col 12, Para 8).
10. The various components of Claim 1 are covered by **XA** as follows:
1. The claim specifies, "Generating a **polyhedral representation** of a computer modeled object". **XA** specifies, Col 3, Para 4, "A body can be **represented by** a union of complex **polygons and polyhedra**".
 2. The claim specifies, "Representing the **motion** of the object with a **set of position matrices**". **XA** specifies, Col 4, Para 4, "**Data structures** allow each body to be mapped to a **different position and location** in space, simply by applying the respective mapping to the vertices".
 3. The claim specifies, "Determining a **subset of free neighborhood entities** comprising the object for each matrix". **XA** specifies, Col 2, Para 2, "Hierarchical structures use **various primitives** to bound an object or its surface".
 4. The claim specifies, "**Generating traces by the motion** of the free neighborhood entities". **XA** specifies, Col 3, Para 4, "Swept body representation comprises a

hierarchical bounding volume representation. It is a **region swept by the surface** of the body **during translation**".

5. The claim specifies, "**Constructing** a representation of the **swept volume** from the traces". **XA** specifies, Col 3, Para 4, "Swept body representation comprises a **hierarchical bounding volume** representation. It is a region swept by the surface of the body during translation".

11. Claim 2 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

Claim 2 includes the method of Claim 1 and further specifies:

1. The free neighborhood entity is an edge.

XA also specifies this step. **XA** specifies, Col 3, Para 4, "A body can be represented by a union of complex polygons and polyhedra" and Col 2, Para 2, "Hierarchical structures use various primitives to bound an object or its surface". It is understood that a primitive of a polyhedron is an edge

12. Claim 3 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

Claim 3 includes the method of Claim 1 and further specifies:

1. The free neighborhood entity is a triangle.

XA also specifies this step. **XA** specifies, Col 3, Para 4, "A body can be represented by a union of complex polygons and polyhedra" and Col 2, Para 2, "Hierarchical structures use various primitives to bound an object or its surface". It is understood that a primitive of a polyhedron is a triangle.

13. Claim 9 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

Claim 9 includes the method of Claim 1 and further specifies:

1. The motion between two consecutive matrices is assumed to be linear.

XA also specifies this step. **XA** specifies, Col 3, Para 4, "A body undergoing translation can be represented by swept body representations".

14. Claim 10 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

Claim 10 includes the method of Claim 1 and further specifies:

1. An entity comprising an object and moving inside the material of the object is filtered.

XA also specifies this step. **XA** specifies, Col 3, Para 4, "Interactions between bodies can be modeled by modeling the interactions between convex hulls of finite sets of discrete points in the swept body representation".

15. Claim 11 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

As per Claim 11, **XA** teaches the methodology of the claim as discussed in regards to Claim 1 above. **XA** also teaches (Item 17, Paragraph 9 above) a computer system for controlling the generation of a swept volume model comprising a processor, a user input device and a display (output unit). **XA** does not specifically teach a graphical user interface responsive to activation with the user input device by causing a program stored in the memory to be executed.

It is inherent that computer systems use a graphical user interface responsive to activation with the user input device.

16. Claim 12 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

Claim 12 includes the computer system of Claim 11 and further specifies:

1. The position matrices representing motion of the free neighborhood entities are created referencing a database comprising data collected during physical experiments.

XA also specifies this step. **XA** specifies, Item 9, Para 9 above, "The representations can be from measured parameters from physical devices or models or computer predicted data".

17. Claim 13 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

Claim 13 includes the computer system of Claim 11 and further specifies:

1. The position matrices representing motion of the free neighborhood entities are calculated in response to selection of a motion type from a user interactive menu

XA also specifies this step. **XA** specifies, Item 8, Para 9 above, "The moving bodies each experience independent linear translation and can also experience a rotation" and Item 15, Para 9 above, "At each node of the bounding volume representation, they apply the motion transformation to the vertices of the polygon or polyhedron at the node and add the resulting vertices to those at the node".

18. Claim 16 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **Xavier (XA)**.

Claim 16 specifies:

1. Select an object.
2. Extract an array of free neighborhood of triangles and edges from the object based on trajectory.
3. Select a position matrix.
4. Transform an array of triangles and edges according to the position matrix.
5. Compute a trace for an edge comprising the array and moving through the tangent zone and adding the edge to the table or adding a triangle moving through a material zone to the table.
6. Modeling a polyhedron from data stored in the table.

19. **Xavier (XA)** (U.S. Patent 6,099,573) teaches that:

1. A body can be represented by a union of complex polygons and polyhedra (Col 3, Para 4).
2. Data structures allow each body to be mapped to a different position and location in space, simply by applying the respective mapping to the vertices (Col 4, Para 4).
3. Input representations are transformed into hierarchical bounding volume representations. The hierarchy produced by the method is a binary tree whose nodes each contain a convex polygon or convex polyhedron (Col 4, Para 3).
4. A variation is to limit the number of vertices on each polyhedron or polygon at interior nodes of the bounding volume hierarchy (Col 4, Para 3).
5. At each node of the bounding volume representation, they apply the motion transformation to the vertices of the polygon or polyhedron at the node and add the resulting vertices to those at the node (Col 4, Para 5).

20. The various components of Claim 16 are covered by **XA** as follows:

1. The claim specifies, "Select an object" and "Extract an array of free neighborhood of triangles and edges from the object based on trajectory". **XA** specifies, Col 3, Para 4, "A body can be **represented** by a union of complex **polygons and polyhedra**".

2. The claim specifies, "Select a position matrix" and "**Transform** an array of triangles and edges according to the position matrix". **XA** specifies, Col 4, Para 4, "**Data structures** allow each body to be mapped to a **different position and location** in space, simply by applying the respective mapping to the vertices".
3. The claim specifies, "Compute a trace for an edge comprising the array and moving through the tangent zone and adding the edge to the table or adding a triangle moving through a material zone to the table". **XA** specifies, Col 4, Para 5, "At each node of the bounding volume representation, they apply the motion transformation to the vertices of the polygon or polyhedron at the node and add the resulting vertices to those at the node".
4. The claim specifies, "Modeling a polyhedron from data stored in the table". **XA** specifies, Col 4, Para 3, "Input representations are transformed into hierarchical bounding volume representations. The hierarchy produced by the method is a binary tree whose nodes each contain a convex polygon or convex polyhedron".

21. Claim 17 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

As per Claim 17, **XA** teaches the methodology of the claim as discussed in regards to Claim 1 above. **XA** also teaches (Items 17 and 18, Paragraph 9 above) a computer program residing on a computer readable medium.

22. Claim 18 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

Claim 18 includes the computer program of Claim 17 and further specifies:

1. An entity comprising an object and moving inside the material path of the object is filtered.

XA also specifies this step. **XA** specifies, Col 4, Para 5, "At each node, an actual bounding volume is not computed but rather a set of vertices whose convex hull is the bounding volume is computed".

23. Claim 19 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **Xavier (XA)**.

Claim 19 specifies:

1. A method for interacting with a computer to model a swept volume.
2. Launching a program that includes a command to generate a swept volume model.
3. Selecting an object to model.

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4. Selecting a motion to be applied to the object
 5. Issuing a command to generate a polyhedron representing a swept volume.
24. **Xavier (XA)** (U.S. Patent 6,099,573) teaches that:
1. The apparatus consists of a Processor connected with input subsystem, output subsystem and storage subsystem (Col 12, Para 7).
 2. The means can be programmed in software (Col 12, Para 8).
 3. Bodies undergoing translations and rotations are represented by swept volume representations (Col 3, Para 3).
 4. Input representations are transformed into hierarchical bounding volume representations. The hierarchy produced by the method is a binary tree whose nodes each contain a convex polygon or convex polyhedron (Col 4, Para 3).
 5. At each node of the bounding volume representation, they apply the motion transformation to the vertices of the polygon or polyhedron at the node and add the resulting vertices to those at the node (Col 4, Para 5).
25. The various components of Claim 19 are covered by **XA** as follows:
1. The claim specifies, "A method for interacting with a computer to model a swept volume" and "Launching a program that includes a command to generate a swept volume model". **XA** specifies, Col 12, Para 7, "The apparatus consists of a Processor connected with input subsystem, output subsystem and storage subsystem" and Col 12, Para 8, "The means can be programmed in software".
 2. The claim specifies, "Selecting an object to model" and "Selecting a motion to be applied to the object". **XA** specifies, Col 3, Para 3, "Bodies undergoing translations and rotations are represented by swept volume representations".
 3. The claim specifies, "Issuing a command to generate a polyhedron representing a swept volume". **XA** specifies, Col 4, Para 3, "Input representations are transformed into hierarchical bounding volume representations. The hierarchy produced by the method is a binary tree whose nodes each contain a convex polygon or convex polyhedron" and Col 4, Para 5, "At each node of the bounding volume representation, they apply the motion transformation to the vertices of the polygon or polyhedron at the node and add the resulting vertices to those at the node".
26. Claim 20 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by **XA**.

Claim 20 includes the method of interacting with the computer of Claim 19 and further specifies:

1. The motion selected is translation.

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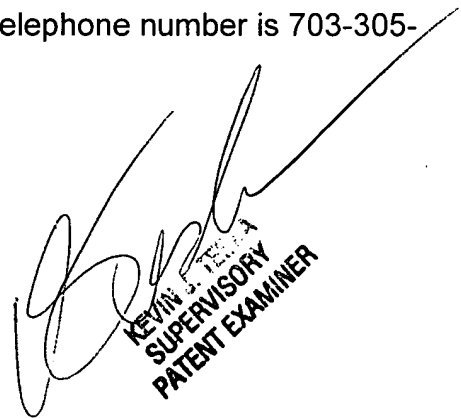
XA also specifies this step. **XA** specifies, Col 3, Para 12, "The moving bodies each experience independent linear translation and can also experience a rotation".

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kandasamy Thangavelu whose telephone number is 703-305-0043. The examiner can normally be reached on Monday through Friday from 7:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska, can be reached on (703) 305-9704. The fax phone number for the organization where this application or proceeding is assigned is 703-746-7329.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9600.

K. Thangavelu
Art Unit 2123
October 10, 2001



KEVIN S. TESKA
SUPERVISORY
PATENT EXAMINER